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A COMPARISON OF TWO AERIAL FILM TYPES IN DETECTING AIR POLLUTION INJURY TO EASTERN WHITE PINE (*PINUS STROBUS* L.)

By

William H. Sites and Betty R. White[1/]

ABSTRACT

A pilot study was conducted in July and August of 1974 to study the reliability of two aerial film types in delineating air pollution injury to eastern white pine (*Pinus strobus* L.)[2/] True color (Kodak Ektachrome MS Aerographic 2448) proved to be the most reliable in both the identification of this species and of affected individuals within the population. Infrared film (Kodak Aerochrome Infrared Film 2443) was less reliable.

INTRODUCTION

Aerial detection of air pollution injury to vegetation is not new. Specific surveys to test the use of various film types as well as to delineate affected areas have been conducted over the last several years (Landgraf et al, 1969 and Larsh et al, 1969).

This survey was conducted so that two film types - true color (Kodak Ektachrome MS Aerographic 2448 9 1/2" X 125') and infrared (Kodak Aerochrome Infrared Film 2443 9 1/2" X 125') could be compared for their resolution of individuals within dense stands and color differences between affected trees. The target species was eastern white pine (*Pinus strobus* L.), since it has shown a definite effect

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1/ The principal investigators are Plant Pathologist and Biological Technician, respectively, with S&PF, Division of Forest Pest Management.

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from air pollution in the past (Dochinger and Bender, 1970). The area chosen for the survey included portions of Buncombe and Henderson Counties, North Carolina. No attempt was made to identify either the composition or source of the suspected pollutants.

METHODS

During July 1974, when foliar symptoms were at optimum visibility, two aerial photo missions were made using two different film types. The aircraft, an Aerocommander 500 equipped with a Wilde RC-10 camera and 6-inch focal length lens, was used to obtain both sets of photography. The scale was 1:3000.

Transparencies of both films were taken to the field and checked using the same trees for comparison. The criteria used in making the comparisons were: (1) from which transparency white pine could most easily be distinguished as a species, (2) which of the two showed the best resolution of individual trees within dense stands, and (3) which gave the best color key as to the degree of discoloration. Approximately 50 percent of the 100 or more trees examined were examined for insects, diseases, and other factors that could have caused mimicking symptoms.

Using the true color photographs, an estimate was made of the number of affected trees per acre.

RESULTS

True color film proved to be the best from which to identify both white pine as a species and affected individuals within dense stands. Both lightly and severely affected individuals could be distinguished on the photograph and easily located on the ground. In addition, a range of colors, reflecting the severity of the tip burn, could be readily distinguished on the photos. Infrared film did not provide this same resolution or color differentiation.

The number of affected trees averaged six per acre. This included all trees which showed any discoloration. Since only dominant and co-dominant trees could be isolated on the photos, this figure probably represents an underestimate of the number affected. The tally was made in mixed forest stands.

DISCUSSION

Even though infrared film did show trees affected by air pollution, they were less readily identifiable than the same trees on true color film. The excellent results obtained from color film indicate that it can be a valuable tool in detecting and evaluating widespread injury of this type. In cases of localized fumigations, aerial photography could provide a good record of the perimeter of the affected area, particularly where the acreage had increased with successive fumigations.

Sketch mapping, although not attempted during this survey, would not seem to have the same potential as photography over a wide area. The rather randomized location of the affected white pine, the lack of a specific localized source, and the widespread distribution of the disease within the range of this species would make sketch mapping impractical. Localized fumigations, more easily delineated from an aircraft, would lend themselves more to the less expensive sketch mapping technique. In addition, sketch mapping requires considerable experience. Much valuable time could be wasted if areas or affected trees were incorrectly mapped. In this respect, aerial photography would eliminate the human judgment factor and thus be more accurate.

Currently, demands on our best equipment, an Aerocommander 500 with a Wilde RC-10 camera mounted over the hatch, are heavy. To dovetail photo missions of air pollution injury on an irregular and unscheduled basis may prove difficult. This is particularly true since this equipment is used extensively for southern pine beetle evaluations throughout the Region. Obviously, a clear set of guidelines will have to be drawn up that establish priorities with respect to usage of the aircraft and camera.

At the present time, Forest Pest Management has the aerial photo and sketch mapping capabilities in a limited number of people. If properly coordinated, these individuals may be able to conduct air pollution missions in addition to other disease and insect surveys. In support, the air pollution working group can supply personnel to assist the basic survey crew. This seems to be a more realistic option than the formation of a second crew. This is especially true since this particular camera is quite sophisticated and requires constant use to gain the experience needed to use it efficiently.

Even though aerial photography and sketch mapping can be of value in delineating an area, the true condition of the understory vegetation cannot be determined from the aircraft. There is a serious deficiency in that some of the more important indicators are unobservable from the air.

LITERATURE CITED

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